

What is claimed is:

1. A substantially purified peptide portion of a promyostatin polypeptide.
2. The peptide of claim 1, wherein said promyostatin polypeptide is a
5 vertebrate promyostatin polypeptide.
3. The peptide of claim 1, wherein the promyostatin polypeptide is selected
from the group consisting of:
 - a human promyostatin polypeptide having an amino acid sequence as
10 set forth in SEQ ID NO: 2; and
 - a murine promyostatin polypeptide having an amino acid sequence as
set forth in SEQ ID NO: 4.
4. The peptide of claim 1, wherein the promyostatin polypeptide is selected
15 from the group consisting of:
 - a chicken promyostatin polypeptide having an amino acid sequence as
set forth in SEQ ID NO: 8; and
 - a rat promyostatin polypeptide having an amino acid sequence as set
forth in SEQ ID NO: 6.
- 20 5. The peptide of claim 1, wherein the promyostatin polypeptide is selected
from the group consisting of:
 - a baboon promyostatin polypeptide having an amino acid sequence as
set forth in SEQ ID NO: 10;
 - 25 a bovine promyostatin polypeptide having an amino acid sequence as
set forth in SEQ ID NO: 12;
 - a turkey promyostatin polypeptide having an amino acid sequence as
set forth in SEQ ID NO: 18;
 - a porcine promyostatin polypeptide having an amino acid sequence as
30 set forth in SEQ ID NO: 14; and
 - an ovine promyostatin polypeptide having an amino acid sequence as
set forth in SEQ ID NO: 16.

6. The peptide of claim 1, wherein the promyostatin polypeptide is a zebrafish promyostatin polypeptide having an amino acid sequence as set forth in SEQ ID NO: 20.

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7. The peptide of claim 1, wherein the promyostatin polypeptide is selected from the group consisting of:

a salmon allele 1 promyostatin polypeptide having an amino acid sequence as set forth in SEQ ID NO: 27; and

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a salmon allele 2 promyostatin polypeptide having an amino acid sequence as set forth in SEQ ID NO: 29.

8. The peptide of claim 1, wherein the peptide is proteolytic fragment of a promyostatin polypeptide, or a functional peptide portion thereof, said proteolytic fragment or functional peptide portion thereof having an activity selected from the group consisting of:

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- a) myostatin signal transduction stimulatory activity;
- b) myostatin signal transduction inhibitory activity;
- c) myostatin binding activity;
- d) promyostatin binding activity;
- e) cellular localization activity; and
- f) any combination of a), b), c), d) and e).

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9. The peptide of claim 8, wherein the peptide is produced by cleavage of a promyostatin polypeptide at a proteolytic cleavage site comprising the amino acid sequence:

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Arg-Xaa-Xaa-Arg (SEQ ID NO: 21).

10. The peptide of claim 9, wherein said proteolytic cleavage site comprises an amino acid sequence corresponding to amino acid residues 263 to 266 as set forth in SEQ ID NO: 2.

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11. The peptide of claim 8, which is a myostatin prodomain comprising amino acid residues about 20 to 262 of a promyostatin polypeptide, or a functional peptide portion thereof.

5 12. The peptide of claim 11, wherein the myostatin prodomain comprises an amino acid sequence selected from the group consisting of:

amino acid residues about 20 to 263 as set forth in SEQ ID NO: 4;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 2;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 10;
10 amino acid residues about 20 to 262 as set forth in SEQ ID NO: 12;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 8;
amino acid residues about 20 to 263 as set forth in SEQ ID NO: 6;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 18;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 14;
15 amino acid residues about 20 to 262 as set forth in SEQ ID NO: 16;
amino acid residues about 20 to 262 as set forth in SEQ ID NO: 20;

and

a functional peptide portion thereof.

20 13. The peptide of claim 8, which is a myostatin prodomain comprising an amino acid sequence selected from the group consisting of amino acid residues 1 to about 44 of SEQ ID NO: 27 and amino acid residues 1 to about 23 of SEQ ID NO: 29.

25 14. The peptide of claim 11, further comprising about amino acids residues 1 to 20 of a promyostatin polypeptide.

15 15. The peptide of claim 11, further comprising about amino acids residues 1 to 20 of a promyostatin polypeptide selected from the group set forth as SEQ ID NOS: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 27 and 29.

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16. The peptide of claim 8, wherein the peptide is a mature myostatin comprising about amino acid residues 268 to 374 of a promyostatin polypeptide, or a functional peptide portion of.

5 17. The peptide of claim 16, wherein the mature myostatin comprises an amino acid sequence selected from the group consisting of:

amino acid residues about 268 to 375 as set forth in SEQ ID NO: 4;
 amino acid residues about 267 to 374 as set forth in SEQ ID NO: 2;
 amino acid residues about 267 to 374 as set forth in SEQ ID NO: 10;
 10 amino acid residues about 267 to 374 as set forth in SEQ ID NO: 12;
 amino acid residues about 267 to 374 as set forth in SEQ ID NO: 8;
 amino acid residues about 268 to 375 as set forth in SEQ ID NO: 6;
 amino acid residues about 267 to 374 as set forth in SEQ ID NO: 18;
 amino acid residues about 267 to 374 as set forth in SEQ ID NO: 14;
 15 amino acid residues about 267 to 374 as set forth in SEQ ID NO: 16;
 amino acid residues about 267 to 374 as set forth in SEQ ID NO: 20;

and

a functional peptide portion thereof.

20 18. The peptide of claim 8, wherein the peptide is a mature myostatin comprising an amino acid sequence selected from the group consisting of:

- a) amino acid residues about 49 to 157 of SEQ ID NO: 27;
- b) amino acid residues about 28 to 136 of SEQ ID NO: 29, and
- c) a functional peptide portion of a) or b).

25 19. A mutant promyostatin polypeptide, comprising a mutation which disrupts proteolytic cleavage at a proteolytic cleavage site comprising the amino acid sequence:

Arg-Xaa-Xaa-Arg (SEQ ID NO: 21).

30 20. The mutant promyostatin polypeptide of claim 19, wherein said mutation comprises a mutation of an Arg residue of SEQ ID NO: 21.

21. A substantially purified polynucleotide encoding a peptide portion of a promyostatin polypeptide.

5 22. The polynucleotide of claim 21, wherein said polynucleotide encodes a prodomain of the promyostatin polypeptide or a functional peptide portion of the prodomain.

10 23. The polynucleotide of claim 22, wherein said prodomain or functional peptide portion thereof further comprises a promyostatin signal peptide.

24. A polynucleotide encoding the mutant promyostatin polypeptide of claim 19.

15 25. A transgenic non-human organism, comprising the polynucleotide of claim 21.

20 26. A transgenic non-human organism, comprising the polynucleotide of claim 24.

27. An antibody that specifically binds a peptide portion of a promyostatin polypeptide.

25 28. The antibody of claim 27, wherein said antibody specifically binds a prodomain of the promyostatin polypeptide or a functional peptide portion of the prodomain.

30 29. A virtual representation of a promyostatin polypeptide, or a functional peptide portion of the promyostatin polypeptide.

30. The virtual representation of claim 29, wherein the functional peptide portion of the promyostatin polypeptide is a myostatin prodomain or a functional peptide portion thereof.

5 31. A method of identifying a functional peptide portion of a myostatin prodomain that interacts specifically with a myostatin peptide, the method comprising:

a) testing a peptide portion of a myostatin prodomain for the ability to interact specifically with a myostatin peptide; and

10 b) detecting a specific interaction of the peptide portion with the myostatin peptide, thereby identifying a functional peptide portion of the myostatin prodomain.

15 32. The method of claim 31, wherein said testing is performed in a computer system using a virtual peptide portion of a promyostatin prodomain and a virtual myostatin peptide.

20 33. The method of claim 31, wherein said testing comprises contacting the peptide portion of the myostatin prodomain and the myostatin peptide under conditions suitable for a myostatin prodomain to specifically interact with a myostatin peptide.